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EXAMINER

SAAD, ERIN BARRY

ART UNIT

PAPER NUMBER

1793

NOTIFICATION DATE

DELIVERY MODE

09/03/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/576,963	<b>Applicant(s)</b> PAUL ET AL.	
	<b>Examiner</b> ERIN B. SAAD	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 17, 19-28, 30-40 and 66-75 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-40 and 66-75 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 April 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)                        | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/15/2010 has been entered.

### ***Specification***

2. The disclosure is objected to because of the following informalities: The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code (page 12 of specification). Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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4. Claims 73 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Regarding claim 73, the original disclosure does not have implicit or explicit support for the load cell being pre-loaded with a bonding pressure.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 24-33 and 73 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 24 is indefinite because the preamble states "A method for bonding laminae together to form a device". The last step of the claim then states "bonding laminae together using the device". It is unclear if the method is to form a device or to bond laminae using the device. For the purpose of examination, the method is to bond the laminae using the device.

Claim 73 is indefinite because it is unclear what is meant by "the load cell is preloaded with bonding pressure". It is not understood how a load cell could be preloaded. For the purpose of examination, the claim will read "the load cell measures a predetermined bonding pressure".

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 24-25 and 28 are rejected under 35 U.S.C. 102(e) as being anticipated by Soberay (2003/0183345).

Regarding claim 24, Soberay discloses a method for bonding laminae together with a device comprising providing a thermally assisted bonding unit that bonds laminae together comprising at least one fluid expansion unit 22; thermally registering plural laminae using a registration fixture/rubber 75 (figure 1, paragraph 0021). It is the Examiner's position that the rubber 75 at would be capable of flexing when displaced by expanding laminae.

Regarding claims 25 and 28, Soberay discloses pins 47 that go through the platen to hold them in place during bonding of the stacked laminae (figures 1, 8-9, paragraphs 0021-0022, 0027-0028).

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9. Claim 68 are rejected under 35 U.S.C. 102(b) as being anticipated by Barry, Jr. et al. (4,689,108).

Regarding claim 68, Barry discloses that the thermally assisted bonding unit further comprises a frame having a base plate 13, a top plate 27, and support rods 28, 29 (portions with springs 30,31) positioned between and coupling the base plate and the top plate, the fluid expansion unit 22 positioned between the base plate and the top plate; and platen assembly 15, 32 for contacting the laminae (WP), the thermally assisted bonding unit further comprising a load cell 26; and bonding laminae together using the device (figure 1, column 1 line 52- column 2 line 44).

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 17, 19, 23-24, 34 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777).

Regarding claim 17, McHerron discloses a method for bonding laminae together to form a device comprising providing a thermally assisted bonding unit comprising at least one fluid expansion unit 42, loading the laminae in the thermally assisted bonding unit, placing the thermally assisted bonding unit and laminae in a furnace, heating the

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laminae and the bonding unit in the furnace, and applying a bonding pressure to the laminae using the thermally assisted bonding unit (paragraphs 0012-0021 and figure 4).

McHerron also discloses using a bellows that fills with gas from an inlet valve and a pressure relief valve. The thermal expansion of the bellows upon heating in the oven cooperates with the expansion block to exert the gas on the workpiece. The pressure relief valve may be set such that if the predetermined pressure threshold is reached in the bellows, any excess pressure from the bellows is relieved by the opening of the relief valve so it is not applied to the workpiece (paragraph 0044). The faster the laminae are heated, the faster the bellows would be adjusted to accommodate the change in thermal expansion. This would indicate that the timing of the application of bonding pressure is determined by adjusting the fluid mass in the fluid expansion unit.

McHerron does not disclose that the laminae are heated to  $\pm 50$  C of the bonding temperature. However, to one skilled in the art at the time of the invention it would have been obvious to heat the laminae within a range close to the bonding temperature to ensure that the laminae are bonded. If heated too high above the bonding temperature, the laminae may be damaged. Heated too low below the bonding temperature, the laminae may not be bonded.

Regarding claim 19, McHerron discloses a belt/conveyorized furnace (paragraph 0034).

Regarding claim 23, McHerron discloses thermally registering plural lamina using a registration fixture 14 prior to bonding laminae (paragraphs 0033-0034).

Regarding claim 24, McHerron discloses a method for bonding laminae together to with a device comprising providing a thermally assisted bonding unit 10 comprising thermally registering plural laminae using a registration fixture prior to bonding laminae 22, where the registration fixture includes flexible laminae engagement portions/shims 26 and bonding the laminae together (figure 1, paragraph 0041). McHerron does not specifically state that the engagement portions flex when displaced by the expanding laminae. However, since the shims 26 are made from a thin fluoropolymer, it is the Examiner's position that force exerted on the shim 26 by the laminae would cause the shim to flex.

McHerron does not specifically disclose a least one fluid expansion unit in figure 1. However, McHerron does disclose using a fluid expansion unit with the bonding unit in a different embodiment (figure 4). To one skilled in the art at the time of the invention it would have been obvious to use a fluid expansion unit for applying pressure because amount of pressure being applied would be easily and accurately controlled to ensure the proper pressure is being applied to the laminae.

Regarding claim 34, McHerron does not specifically disclose prebonding a first stack of at least two laminae and prebonding a second stack of at least two laminae, the first stack and the second stack being subsequently bonded together. However, selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results; In re Gibson, 39 F.2d 975, 5USPQ 230 (CCPA 1930) (MPEP 2144). To one skilled in the art at the time of the invention it would have been obvious to bond the laminae in a sequence suitable to create a desirable end product.



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Regarding claim 67, McHerron discloses method using a thermally assisted bonding unit comprising a frame having a base plate (bottom plate) 12, a top plate 16 and support rods 18 positioned between and coupling the base plate to the top plate, the fluid expansion unit 42 being positioned between the base plate and the top plate (figure 4). McHerron discloses a first platen 14 positioned between the fluid expansion unit and the base plate contacting the upper surface of the laminae (figure 4). In figure 4, McHerron does not specifically disclose a second platen positioned between the at least one fluid expansion unit and the base plate contacting a lower surface of the laminae. However, McHerron does disclose that a platen (shims) may be placed between the laminae (workpiece) and the bottom plate or the expansion block [Claim 2]. In the instant case, McHerron establishes that a platen may be placed between the laminae (workpiece) and the bottom plate.

12. Claims 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777), as applied to claim 17 and further in view of Alley et al. (5,232,145).

Regarding claim 20, McHerron does not specifically disclose forced convective heating of the laminae. However, Alley does disclose using forced convective heating with nitrogen (paragraphs 0034-0036). To one skilled in the art at the time of the invention it would have been obvious to use forced convective heating with nitrogen to heat the laminae of McHerron because it provides an even heating of the laminae and is easily controlled by the user (paragraphs 0034-0036).

Regarding claim 21, McHerron does not specifically disclose using an inert gas in the furnace. However, Alley does disclose using an inert gas (paragraphs 0034-0036). To one skilled in the art at the time of the invention it would have been obvious to use an inert gas furnace because Alley discloses that it is a well known gas to use in a solder furnace (column 4 lines 7-48) and prevents oxidation of the workpieces during bonding.

Regarding claim 22, McHerron does not disclose gas in the heater/oven. However, Alley does disclose a cover gas in the oven (paragraphs 0034-0036). While Alley does not specifically disclose that the gas is contained in the system, it would be obvious to one skilled in the art at the time of the invention that the gas would be contained in the oven of Alley since the oven is covered and Alley discloses that the gas flow is controlled in the oven (column 5 lines 44-68).

13. Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soberay (6,662,841) in view of Ward (3,356,360).

Regarding claim 26, Soberay discloses a registration element/pins 47 that go through the platens to hold the lamina in place during bonding (paragraphs 0021-0022). Soberay does not specifically disclose that the pins 47 are integral in the lamina. However, Ward discloses a lamination stack bonding apparatus with pins 17 that pass through the lamination stack during bonding (column 2 line 64 to column 3 line 10). To one skilled in the art at the time of the invention it would have been obvious to have the

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pins pass through the lamina during bonding to hold them in place to prevent misalignment.

Regarding claim 27, Soberay discloses a registration element/pins 47 that go through the platens to hold the lamina in place during bonding (paragraphs 0021-0022). Soberay does not specifically disclose that the pins 47 are embedded in the lamina. However, Ward discloses a lamination stack bonding apparatus with pins 17 that pass through the lamination stack during bonding (column 2 line 64 to column 3 line 10). To one skilled in the art at the time of the invention it would have been obvious to have the pins pass through the lamina during bonding to hold them in place to prevent misalignment.

14. Claims 30-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777) as applied to claim 24 above, and further in view of Hirata et al. (6,027,276)

Regarding claim 30, McHerron does not disclose at least one pressure regulating spring and where the laminae are positioned between the at least one pressure regulating spring and the at least one fluid expansion unit. However, Hirata teaches the use of a fluid expansion unit to apply the necessary bonding force. Hirata also teaches the use of a spring incorporated into a damper to release the stress accompanying thermal expansion. To one skilled in the art at the time of the invention it would have been obvious to combine the teachings of McHerron and Hirata and include a spring with the fluid expansion unit. Moreover, it would have been obvious for one of ordinary

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skill in the art at the time the invention to place the laminae between the spring and the fluid expansion unit to release the stress accompanying thermal expansion.

Regarding claim 31, it is the Examiner's position that bonding the laminae using McHerron with Hirata would cause the pressure stored in the springs to be applied to the laminae during the thermal expansion of the laminae.

Regarding claim 32, McHerron discloses that the bonding includes heating the thermally assisted bonding unit, the heat causing an engager 14 to expand such that at a given time after heating, the engager engages the laminae (paragraphs 003-0036, 0044).

Regarding claim 33, it is the Examiner's position that bonding the laminae using McHerron with Hirata would cause the final pressure stored in the springs to be applied to the laminae during the thermal expansion of the laminae.

15. Claims 35, 38-40 and 72-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777) in view of Nagaoka et al. (2004/0012122) and Childers et al. (2004/0086427).

Regarding claim 35, McHerron discloses a method for bonding plural lamina together to form a multilayered device. McHerron discloses a thermally assisted bonding device 310 comprising a frame (formed with the pins 18) functionally associated with the laminae 22 with the device. McHerron discloses a belt/conveyorized furnace to continuously bond the laminae (paragraph 0034).

McHerron does not specifically disclose that the laminae are forming a microfluidic device. McHerron does disclose that the laminae are thin films stacked to form a multilayer thin film structure (paragraph 0003). One reading McHerron as a whole would appreciate that the reference does not specifically disclose what is formed by bonding the multilayer thin films. Childers discloses that a microfluidic device is formed from stacking multilayer thin films. To one skilled in the art at the time of the invention it would have been obvious to use the thermal expansion device of McHerron to bond multilayer films forming a microfluidic device to prevent movement of the layers during bonding and to prevent damage caused by overpressure.

McHerron also discloses that the pressure relief valve may be set to remove excess pressure when a predetermined value is exceeded (paragraph 0044). McHerron does not specifically disclose how the exceeded pressure is determined. However, Nagaoka discloses using a load cell with a pressure reducing valve for detecting pressure (paragraph 0055). To one skilled in the art at the time of the invention it would have been obvious to use a load cell with the expansion unit of McHerron to prevent an over pressure from damaging the laminae during heating.

Regarding claim 38, McHerron discloses stacking and registering the laminae on the device (paragraphs 0033-0034)

Regarding claim 39, McHerron discloses a thermally assisted registration 14 (paragraph 0033 and figure 4).

Regarding claim 40, McHerron discloses that thermally assisted registration comprises a registration device 18 (paragraph 0044 and figure 4).

Regarding claim 72, McHerron discloses a method for bonding laminae together to form at least a portion of a device comprising providing a bonding unit comprising a frame, a platen 14 assembly for applying a bonding pressure to the laminae; placing laminae in the bonding unit; placing the bonding unit and laminae in a furnace; heating the laminae; and bonding the laminae using the thermally assisted bonding unit (paragraphs 0012-0021 and figure 4).

McHerron does not specifically disclose that the laminae are forming a microfluidic device. McHerron does disclose that the laminae are thin films stacked to form a multilayer thin film structure (paragraph 0003). One reading McHerron as a whole would appreciate that the reference does not specifically disclose what is formed by bonding the multilayer thin films. Childers discloses that a microfluidic device is formed from stacking multilayer thin films. To one skilled in the art at the time of the invention it would have been obvious to use the thermal expansion device of McHerron to bond multilayer films forming a microfluidic device to prevent movement of the layers during bonding and to prevent damage caused by overpressure.

McHerron also discloses that the pressure relief valve may be set to remove excess pressure when a predetermined value is exceeded (paragraph 0044).

McHerron does not specifically disclose how the exceeded pressure is determined. However, Nagaoka discloses using a load cell with a pressure reducing valve for detecting pressure (paragraph 0055). To one skilled in the art at the time of the invention it would have been obvious to use a load cell with the expansion unit of McHerron to prevent an over pressure from damaging the laminae during heating.

Regarding claim 73, McHerron discloses that the pressure relief valve may be set to remove excess pressure when a predetermined value is exceeded (paragraph 0044). McHerron does not specifically disclose how the exceeded pressure is determined. However, Nagaoka discloses using a load cell with a pressure reducing valve for detecting pressure (paragraph 0055). To one skilled in the art at the time of the invention it would have been obvious to use a load cell with the expansion unit of McHerron to prevent an over pressure from damaging the laminae during heating.

Regarding claim 74, McHerron discloses that the bonding unit include a fluidic device 36,42 to apply bonding pressure to the laminae (figure 4, paragraph 0044).

16. Claims 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777), Nagaoka et al. (2004/0012122) and Childers et al. (2004/0086427) as applied to claim 35 and further in view of Alley et al. (5,232,145).

Regarding claim 36, McHerron does not specifically disclose forced convective heating of the laminae. However, Alley does disclose using forced convective heating with gas (column 4 lines 7-44). To one skilled in the art at the time of the invention it would have been obvious to use forced convective heating with nitrogen to heat the laminae of McHerron because it provides an even heating of the laminae and is easily controlled by the user (column 44-68).

Regarding claim 37, McHerron does not specifically disclose using an inert gas in the furnace. However, Alley does disclose using an inert gas (column 4 lines 7-48). To one skilled in the art at the time of the invention it would have been obvious to use an

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inert gas furnace because Alley discloses that it is a well known gas to use in a solder furnace (column 4 lines 7-48) and prevents oxidation of the workpieces during bonding.

17. Claim 66 is rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777) as applied to claim 17 above, and further in view of Callahan et al. (2005/0007748).

Regarding claim 66, McHerron does not disclose at least one pressure regulating spring functionally associated with the unit to apply pressure to the laminae. However, Callahan does disclose a pressure regulating spring 24 for a unit for holding circuit pieces/laminae together where the laminae is located between the spring and the top plate (figure 3). To one skilled in the art at the time of the invention it would have been obvious to use a pressure regulating spring in the unit of McHerron because Callahan discloses that it distributes the compressive forces to create an even press (paragraphs 0004-0006).

18. Claim 67 is rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777 as applied to claim 17 above, and further in view of Porter et al. (Cost drivers in microlamination based on a high volume production system design. ASME Conf. Proc., January 01, 2002, 267-274).

This is a backup rejection for claim 67 in case the Applicant does not agree that the shim is considered a platen.



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Regarding claim 67, McHerron discloses method using a thermally assisted bonding unit comprising a frame having a first base plate (bottom plate) 12, a top plate 16 and support rods 18 positioned between and coupling the base plate to the top plate, the fluid expansion unit 42 being positioned between the base plate and the top plate (figure 4). McHerron discloses a first platen 14 positioned between the fluid expansion unit and the base plate contacting the upper surface of the laminae (figure 4). In figure 4, McHerron does not specifically disclose a second platen positioned between the at least one fluid expansion unit and the base plate contacting a lower surface of the laminae.

Porter discloses the placement of platens on the top and bottom surfaces of laminae. Porter placed a graphite platen at the bottom of a stack of laminae for stability, ease of clamping and alignment accuracy. Porter also teaches the placement of a second graphite platen on the top of a stack of laminae. Then, Porter added a release agent to both planes to permit the device and graphite plates to separate after bonding. [Bridging paragraph, page 4.] Thus, it would have been obvious for one of ordinary skill in the art at the time the of the invention to place a first platen and a second platen positioned between the at least one fluid expansion unit and the base plate, the first platen contacting the upper surface of the laminae and the second platen contacting a lower surface of the laminae. One of ordinary skill in the art, at the time at the time of the invention would have been motivated to do so because to optimize stability and ease of clamping and alignment accuracy. It also would have been obvious to have a

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first and second platen because the use of platens between laminae is routinely practiced in the art, as evidenced by Porter et al.

19. Claims 68-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777) in view of Nagaoka et al. (2004/0012122).

Regarding claim 68, McHerron discloses a method for bonding laminae together to form a device comprising providing a thermally assisted bonding unit comprising a frame having a base plate 12, a top plate 16 and support rods 18 positioned between the base plate and the top plate, at least one fluidic expansion 42 unit being positioned between the base plate and the top plate, and a platen 14 assembly for contacting laminae 22, and bonding laminae together using the device (figure 4, paragraphs 0012-0021).

McHerron discloses that the pressure relief valve may be set to remove excess pressure when a predetermined value is exceeded (paragraph 0044). McHerron does not specifically disclose how the exceeded pressure is determined. However, Nagaoka discloses using a load cell with a pressure reducing valve for detecting pressure (paragraph 0055). To one skilled in the art at the time of the invention it would have been obvious to use a load cell with the expansion unit of McHerron to prevent an over pressure from damaging the laminae during heating.

Regarding claim 69, McHerron discloses that the thermally assisted bonding unit further comprises a gap height adjustment screw 18 coupled to the top plate 16 (figure 4).

Regarding claim 70, McHerron discloses at least one engager which expands when the unit is heated such that the gap height decreases and a compressive force is applied to the laminae (paragraphs 0012-0021). McHerron does not specifically disclose that the gap height is zero when the compressive force is applied to the laminae. However McHerron does disclose that the gap between the pressure plate and the expansion block is changed thereby applying pressure the workpiece (paragraphs 0020-0021). It is the Examiner's position that it would naturally flow that the gap would have to become zero in order for the force to be applied to the laminae. If the gap height was not at zero, there would be no force being applied.

20. Claim 71 is rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777) in view of Nagaoka et al. (2004/0012122).

Regarding claim 71, McHerron discloses a method for bonding laminae together to form a device comprising providing a thermally assisted bonding unit 310 (figure 4) comprising a frame having a base plate 12, a top plate 16 having a gap height adjustment screw 18 (bottom portion of 18 that is screwed into the base plate 12), support rods 18 (middle portion of rods 18 between the top plate and base plate) positioned between the base plate and the top plate, at least one fluidic expansion unit 36 being positioned between the base plate and the top plate, a platen assembly 14 for contacting the laminae 22, and plural engagers 38,40 (engaging the top plate and the fluid expansion unit); and bonding the laminae together using the device (figure 4, paragraphs 0018-0021).

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McHerron discloses that the pressure relief valve may be set to remove excess pressure when a predetermined value is exceeded (paragraph 0044). McHerron does not specifically disclose how the exceeded pressure is determined. However, Nagaoka discloses using a load cell with a pressure reducing valve for detecting pressure (paragraph 0055). To one skilled in the art at the time of the invention it would have been obvious to use a load cell with the expansion unit of McHerron to prevent an over pressure from damaging the laminae during heating.

21. Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over McHerron et al. (2003/0221777), Nagaoka et al. (2004/0012122) and Childers et al. (2004/0086427) as applied to claim 72 above, and further in view of Johnson (5,313,023).

Regarding claim 75, the type of load cell as taught by McHerron in view of Nagaoka and Childers is not specified. However, Johnson discloses a spring based load cell for measuring pressure (claim 28 and column 1 lines 5-15). To one skilled in the art at the time of the invention it would have been obvious to use a load cell that would determine an accurate calculation of the pressure to prevent damage to the device being bonded.

### ***Response to Arguments***

22. Applicant's arguments filed 7/15/2010 have been fully considered but they are not persuasive.

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23. The Applicant argues that preloading components of applicant's bonding unit with a bonding pressure, such as a load cell, is discussed at several locations in the application. The Applicant argues that the 112 1<sup>st</sup> and 2<sup>nd</sup> rejections should be withdrawn based on the examples provided.

The Examiner disagrees. None of the examples given by the Applicant in the arguments discloses a "load cell". As stated in the previous action, the definition of a load cell is a transducer which converts force into a measurable electrical output. Although there are many varieties of load cells, strain gage based load cells are the most commonly used type. A load cell does not store pressure, it measures pressure and converts into an electrical output. Since there is no clear definition of a load cell in the specification, the Examiner examined the claims based on this known definition. The 112 1<sup>st</sup> and 2<sup>nd</sup> rejections are maintained.

24. Regarding claim 67, the Applicant argues that the 102(b) rejection over Barry (4,689,108) should be withdrawn.

The Examiner agrees. The rejection was supposed to be for claim 68, not 67. The rejection of claim 67 over Barry has been withdrawn.

25. Regarding claims 17, 19 and 23, the Applicant argues that McHerron does not teach or suggest adjusting the timing associated with applying a bonding pressure using a fluid expansion unit to apply pressure to plural laminae. The Applicant argues that McHerron never uses the word "timing". The Applicant also argues that McHerron does not disclose adjusting fluid mass in a fluid expansion unit to time the application of a bonding pressure to plural laminae.

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The Examiner disagrees. While McHerron might not specifically disclose the word "timing", McHerron does disclose using a bellows that fills with gas (fluid) from an inlet valve and a pressure relief valve. The thermal expansion of the bellows upon heating in the oven cooperates with the expansion block to exert the gas on the workpiece. The pressure relief valve may be set such that if the predetermined pressure threshold is reached in the bellows, any excess pressure from the bellows is relieved by the opening of the relief valve so it is not applied to the workpiece paragraph 0044). The faster the laminae are heated, the faster the bellows would be adjusted to accommodate the change in thermal expansion. This would indicate that the timing of the application of bonding pressure is determined by adjusting the fluid mass in the fluid expansion unit.

26. Regarding claim 17, the Applicant argues that McHerron does not teach bonding plural laminae to form a microfluidic device.

Claim 17 does not disclose a microfluidic device.

27. The Applicant argues that the 102(b) rejection of claims 29-30 over Barry should be withdrawn.

There were no 102(b) rejections of claims 29-30 over Barry in the previous office action.

28. Regarding claims 20-22, the Applicant argues that Ally does not cure the deficiencies of McHerron. The Applicant argues that Ally does not disclose a bonding unit as disclosed in claim 17.

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The Examiner disagrees. As stated in the rejection above, it is the Examiner's position that McHerron teaches the claimed invention. Ally was used as a secondary reference to show it would have been obvious to use a conveyor oven as claimed for heating the laminae.

29. Regarding claims 30-33 and 66, the Applicant argues that Callahan does not disclose a thermally assisted bonding unit comprising at least one fluid expansion unit.

As stated in the rejection above, it is the Examiner's position that McHerron teaches the claimed invention. The Examiner acknowledges that Callahan does not disclose a bonding unit with at least one fluid expansion unit. However, Callahan was simply used as a secondary reference to McHerron to show that it would have been obvious to use a spring to distribute the compressive forces to create an even press (paragraphs 0004-0006).

30. Regarding claim 34, the Applicant argues that the rejection over McHerron should be withdrawn since it depends from claim 17.

The Examiner disagrees. As stated in the rejection above, it is the Examiner's position that McHerron teaches the claimed invention.

31. Regarding claims 35, 38-40 and 72-73, the Applicant argues that McHerron does not disclose a load cell as required in claim 35. The Applicant argues that Nagaoka discloses an injection and compression molding machine and not a device for making microfluidic devices.

The Examiner disagrees. The Examiner acknowledged in the rejection that McHerron does not specifically disclose a load cell. Secondary reference Nagaoka

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discloses using a load cell with a pressure reducing valve for detecting pressure (paragraph 0055). Nagaoka may not teach bonding microfluidic devices; however, Nagaoka was simply used as a secondary reference to show that it is well known to use a load cell to detect pressure in a compression machine.

32. Regarding claims 36-37, the Applicant argues that in order to allegedly arrive at all features of claims 36-37, the Office Action had to rely on four separate references. Applicants assert that having to rely on four independent references to allegedly teach the features of the rejected claims is a clear indication that these claims are nonobvious.

The Examiner disagrees. In response to applicant's argument that the examiner has combined an excessive number of references, reliance on a large number of references in a rejection does not, without more, weigh against the obviousness of the claimed invention. See *In re Gorman*, 933 F.2d 982, 18 USPQ2d 1885 (Fed. Cir. 1991).

33. Regarding claims 68-70, the Applicant argues that the deficiencies of McHerron and Nagaoka with respect to teaching the claims are discussed above.

The Examiner maintains the rejection as stated in the response above.

34. Regarding claim 74, the Applicant argues Schomburg is cited as allegedly teaching disclosure of a spring base load cell formation pressure. Claim 74 now recites a fluidic device.

The Examiner has rejected claim 74 based on the new amendment. Schomburg is no longer used as a reference for claim 74.



***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ERIN B. SAAD whose telephone number is (571)270-3634. The examiner can normally be reached on Monday through Thursday from 8am-5pm Eastern time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on (571) 272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/E. B. S./  
Examiner, Art Unit 1793  
7/20/2010

/Jessica L. Ward/  
Supervisory Patent Examiner, Art Unit 1793